

# Plymouth Public Schools' Science and Technology/Engineering Program

## College Prep 1 Physics Course Syllabus

STE0053 Physics College Prep 1

Full year course intended for students in grades 10-12 worth 5 credits

### Course Description

This laboratory course will provide a conceptual foundation in introductory physics along with problem solving strategies. A basic understanding of algebra is recommended. Motion and stability, forces and interactions, energy, and waves and their applications in technologies for information transfer will be presented. Appropriate small group, cooperative lab activities and hands-on experiences will be incorporated to develop students' problem solving skills with practical real world applications. Particular emphasis will be placed on developing and using models, analyzing and interpreting data, and engaging in argument from evidence. This course will provide significant foundational background for those students who wish to expand their understanding of physics to continue in a technical course of studies or humanities program at a post-secondary institution. The prerequisite includes departmental recommendation.

### Instructional Objectives

Students will independently and collaboratively:

1. Engage in scientific inquiry and engineering design through the use of science and engineering practices.
2. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to answer a question or solve a problem.
3. Draw evidence from literary or informational texts to support analysis, reflection, and research.
4. Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience.
5. Demonstrate proficiency in phenomena related to the motion and stability of forces and their interactions, energy, and waves and their applications in technologies for information transfer.

### Themes and Topics

1. Motion – Newton's second law of motion, conservation of momentum, reducing forces in a collision, free-body force diagrams, changes to velocity and acceleration
2. Force Interactions – Newton's law of gravitation, Coulomb's law, effects of gravitational and electrostatic forces between objects
3. Electricity and Magnetism – magnetic fields, electric currents, simple circuits, voltage, current, resistance

4. Energy – total energy in a system, types of energy (e.g., thermal, kinetic, gravitational, magnetic, electrical), motions of particles and objects or energy stored in fields, devices that convert one form of energy into another form of energy
5. Thermal Energy – closed systems, transfer of thermal energy, thermal equilibrium, specific heat
6. Waves – mechanical waves, electromagnetic waves, frequency, wavelength, speed, transverse waves, longitudinal waves, electromagnetic radiation, resonance, interference, diffraction, refraction, photoelectric effect, wave behavior and interactions to transmit and capture information and energy

#### Text and Instructional Materials

Hewitt, Paul G. *Conceptual Physics.*, 2015.

#### Cheating/Plagiarism

The excerpt from the Plymouth Public Schools' Student Handbook on plagiarism and copyright infringement states, "Existing copyright law will govern the use of material accessed through network. The user will not plagiarize works found on the Internet. Plagiarism is taking the ideas or writings of others and presenting them as if they were yours. All copyrighted material used must have the express written permission of the person or organization that owns the copyright. Any student who has cheated on any academic exercise will receive no credit for that exercise. Plagiarism is a form of cheating. A parent/guardian will be notified by the involved teacher in all instances of cheating. The investigation of the claim of cheating and plagiarism will involve the student, teacher, and administration."

#### Grading Policy and Assessment

Levels of proficiency on various tasks and assignments determine student grades. During each grading term, students' grades will be based upon the following:

20% Assignments

40% Labs

40% Tests

The final year average will be calculated as follows:

22.5% Term 1 Grade

22.5% Term 2 Grade

22.5% Term 3 Grade

22.5% Term 4 Grade

10% Final Exam